

What Carbon to Count?

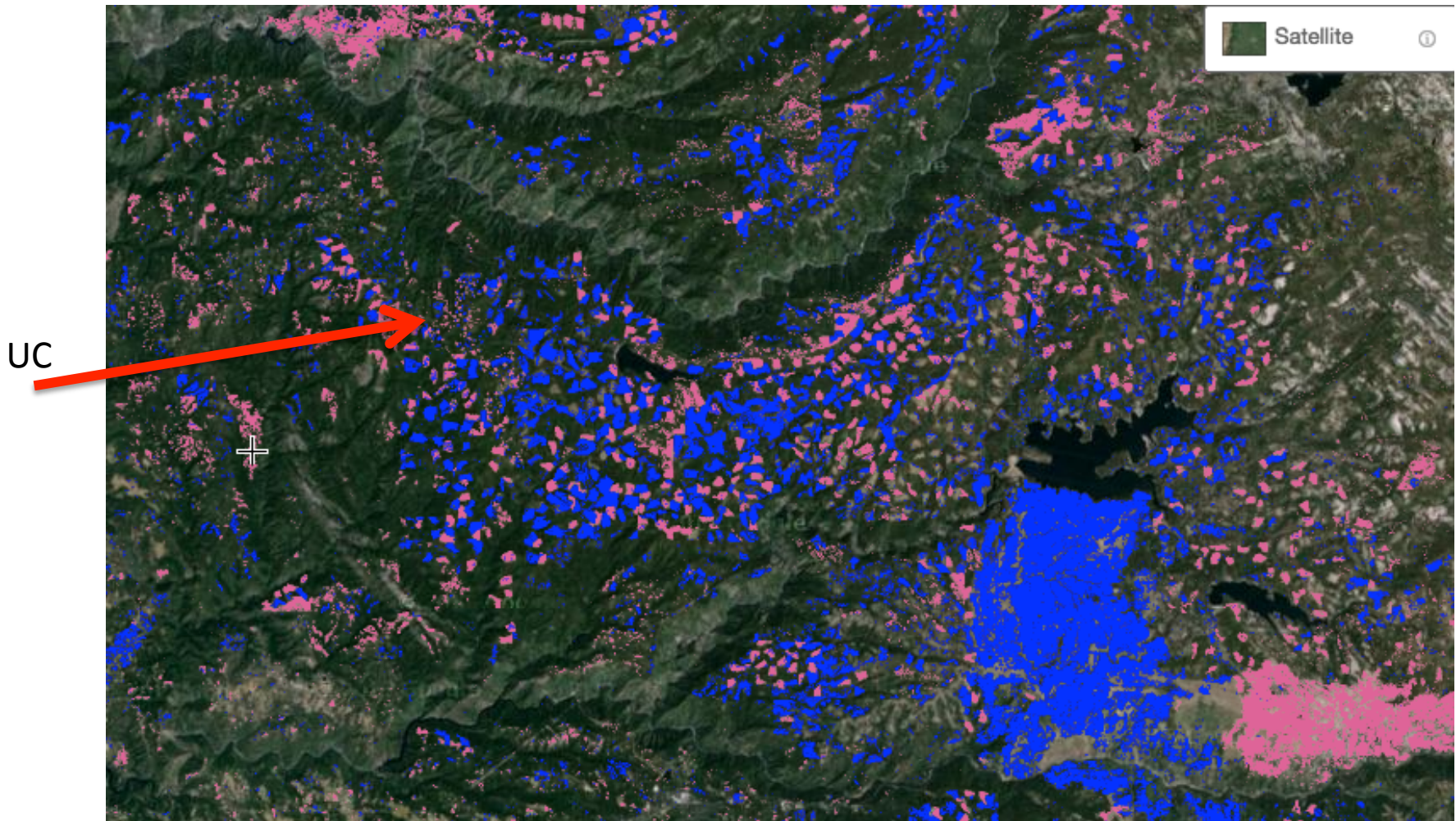
Different state agencies, regulators, consultants, revenue-generating entities, academics, and national forest research organizations are promoting hard-to-compare methods to support sometimes different forest policies

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January 2015 BOF Presentation

Early statewide forest and forest products annual sequestration estimates varied widely

- AB 32 estimate (2008) – 5 mmt CO₂e annual sequestration
- USFS Region 5 Climate Change Interdisciplinary Team (2009) - ~46 mmt CO₂e for NFS only
- FRAP 2010 Assessment, ch 3.7, p261 - ~0 mmt CO₂e annual sequestration for above ground carbon (from an USFS/OSU model)

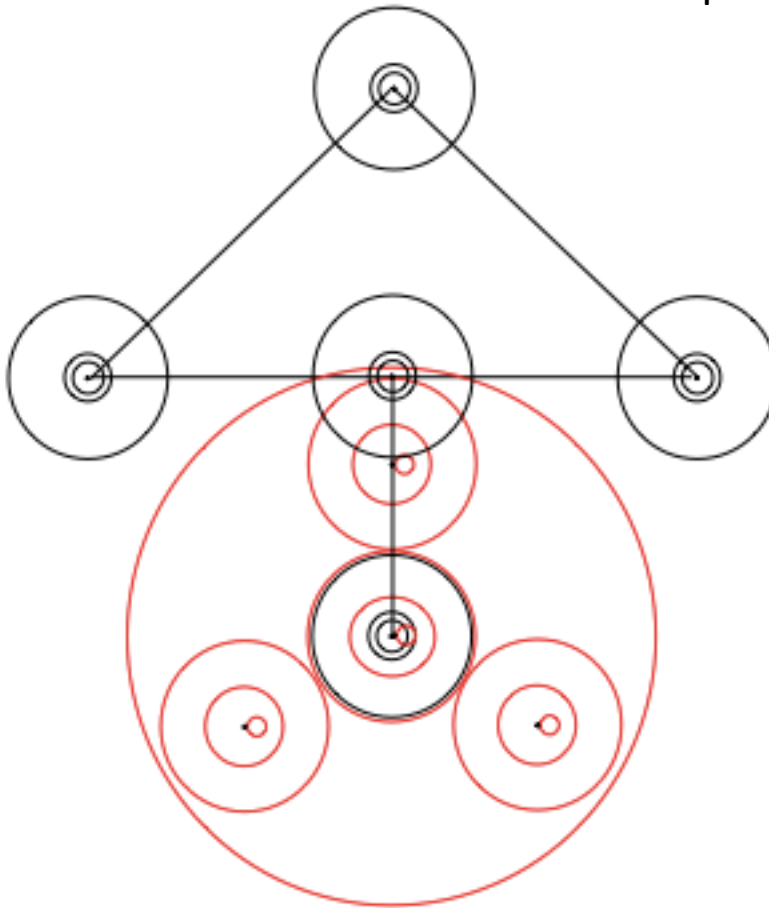
California's forest cover changes with different patterns
Pre King Fire tree cover (proportional to green foliage)
gain, loss, and no measurable change over 10 years
www.globalforestwatch.org



Each row is a 4 million acre 'slice' of California.
Each column is a type of carbon.
Tan is private, Green is federal.
Different methods cover different sets of cells.

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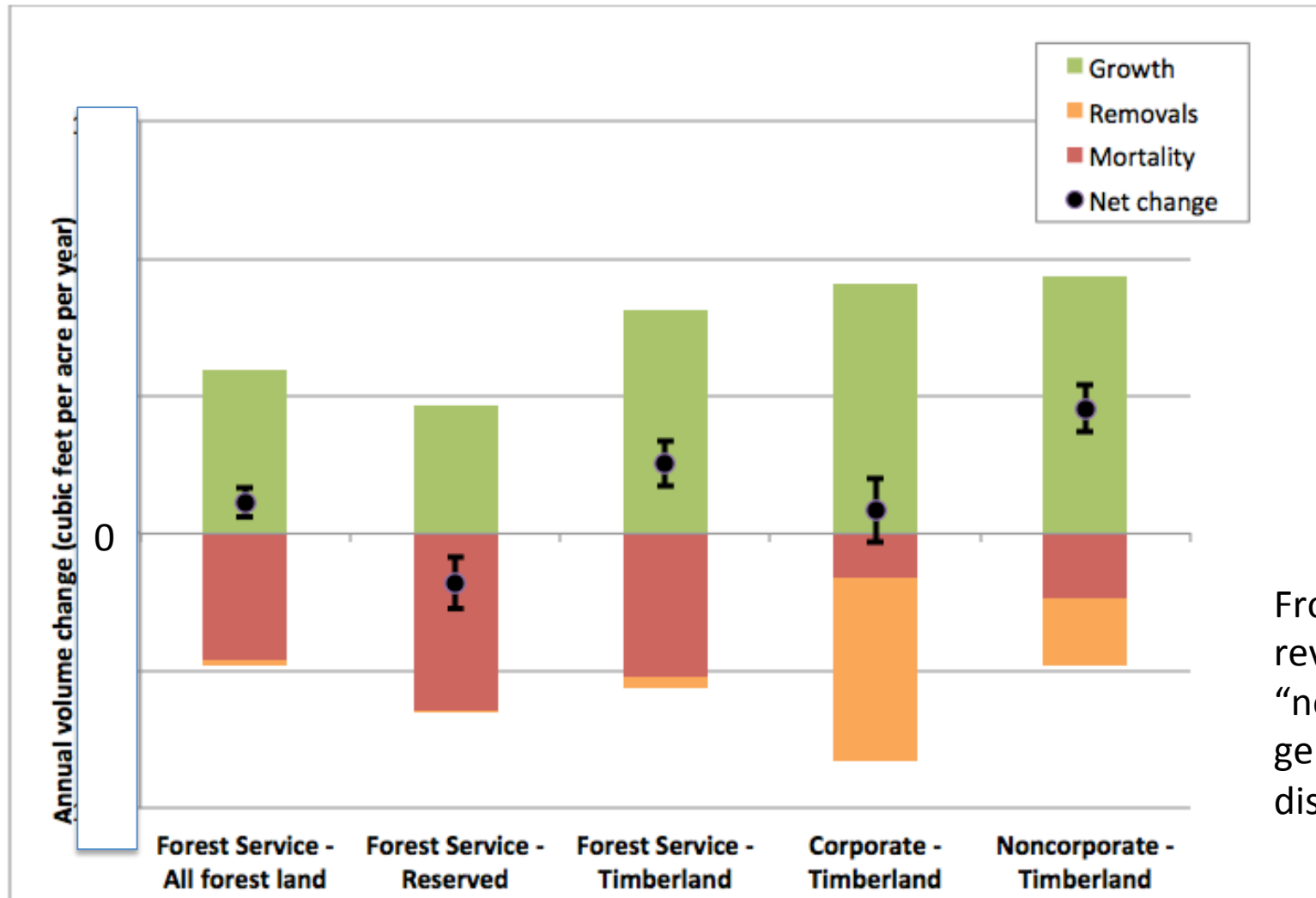
One flux measurement method is to use the same trees on the same FIA plots a decade apart. The 2015 FIA 5 year report summarizes the comparison of 1 shared red/black subplot (for private) and 4 red plots (for USFS). Future results will all be 4 subplot comparisons



FIA used plot data rather than satellite imagery to estimate forest carbon flux. The upcoming FIA 5 year report (PNW, 2015) compared a subset of 1990s plots and 2000s plots to measure what happened to tree carbon over the period. The very different patterns for USFS and private forests are shown on the next slide. Unlike satellites that measure green leaf reflectance, the plot based analysis has detailed data on dead trees and harvested volumes. New data for 2010s and 2000s tracks the same trees on public and private forests.

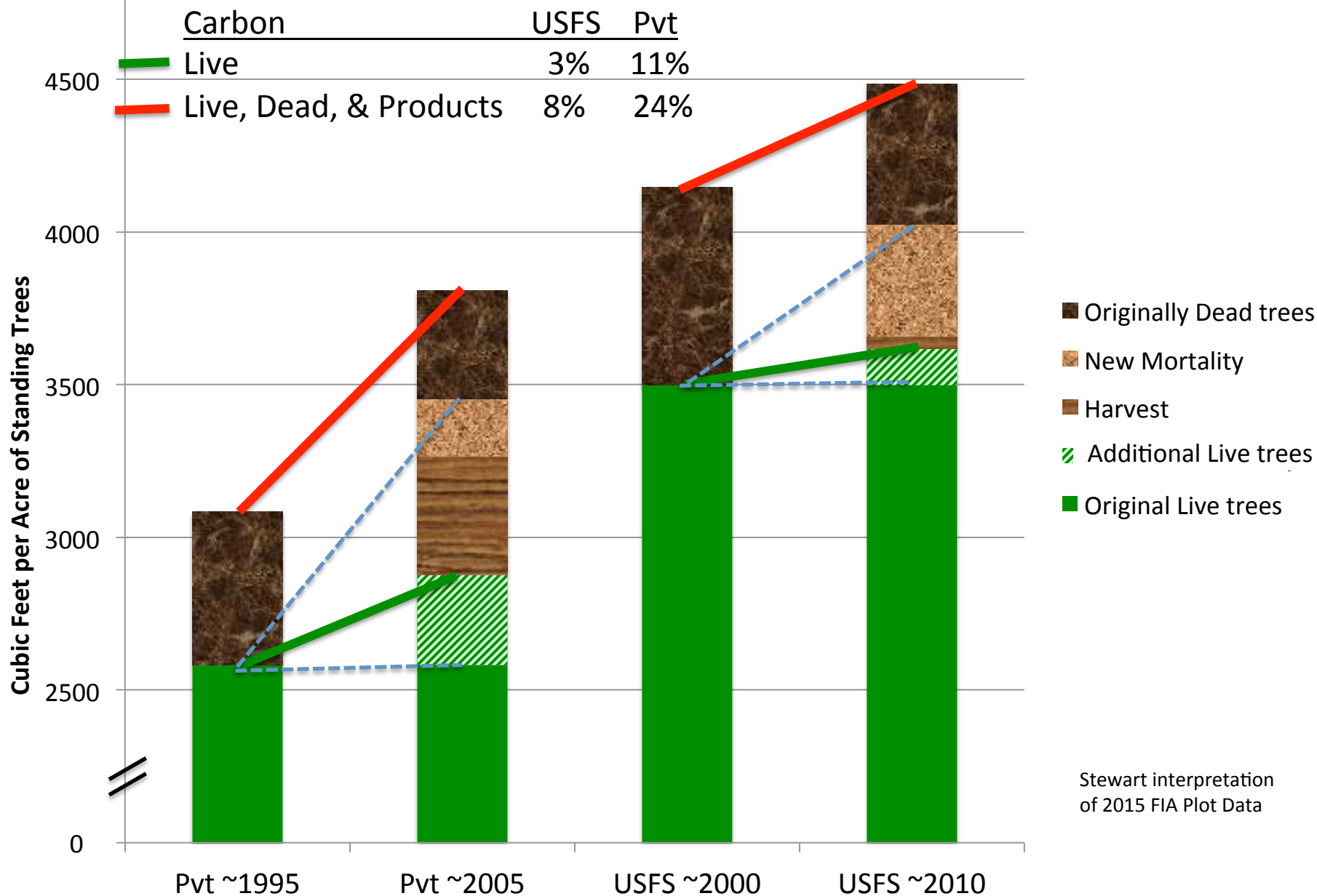
Figure 39 – Relationship of periodic (upper, black figure) and annual (lower, red figure) inventory plot designs. Note that only one subplot center overlaps for both designs.

FIA remeasurements show that live to dead tree transition (mortality and removals) is an important carbon process not captured if only live forest carbon is considered



From the review draft, "not for general distribution"

Decadal Change in Forest Carbon by Ownership based on FIA Plot Data



The FIA subplot comparison and product modeling is only one accounting systems for a specific land area and products

Other Approaches

- USFS Forest Sector in US GHG (USEPA 2014)
- Canadian CBM-CFS3 and CBM-FWHP (2014)
- AB 1504 THP accounting – Blodgett Forest
- ARB 2008 Plan
- ARB 2014 Plan
- CA Natural Resources Agency 4th themes
- BOF Timber and Fire Policies

USFS and Energy Information Agency in US GHG inventory (USEPA 2014)

Mill. Acres	Owner	Soil C	Below C	Down Dead C	Above Dead C	Above Live C	Energy C	End Product C	Landfill C	Substitution C	Out of state C
4	Corp Timber										
8	Family Timber										
12	Opvt Forest										
16	NFS Timber										
20	NFS Timber										
24	ONFS Forest										
28	ONFS Forest										
32	Ofed Forest										
36	Pvt Shrub										
40	Fed Shrub										
44	Fed Shrub										
48	Pvt Grass										
52	Pvt Grass										
56	Pvt Grass										
60	Fed Grass										
64	Pvt Desert										
68	Fed Desert										
72	Fed Desert										
80	Fed Desert										

The USFS estimate is a national estimate used by the US EPA for IPCC reporting. It may be appropriate for California as we import around 80% of the wood products we consume.

<http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html> The USGS LandCarbon assessment http://www.usgs.gov/climate_landuse/land_carbon/ will give different values as it is primarily a remote sensed carbon stock assessment.

Canadian CBM CFS3 & FHWP (2014)

Mill. Acres	Owner	Soil C	Below C	Down Dead C	Above Dead C	Above Live C	Energy C	End Product C	Landfill C	Substitution C	Out of state C
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This is the most recent and most thorough assessment of forest-based carbon sequestration following 2013 IPCC guidance. Nearly all Canadian timberlands are harvested. They use IPCC defaults on product life spans and assume bioenergy replaces an equal quantity of the provincial energy mix (hydro, fossil fuels, other renewables).

<http://www.nrcan.gc.ca/forests/climate-change/13107>

AB 1504 analysis for Blodgett THP

Mill. Acres	Owner	Soil C	Below C	Down Dead C	Above Dead C	Above Live C	Energy C	End Product C	Landfill C	Substitution C	Out of state C
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Private RPFs must assess the AB 1504 carbon sequestration impacts of their THPs. They can use the 2010 Calfire methodology that only counts above ground live C in merchantable volume (MBF) or propose and justify a different approach. We used our own for our last THP that will come out as a *California Agriculture* journal article in Feb/March 2015. See also <http://ucanr.edu/sites/forestry/>

ARB 2008

Mill. Acres	Owner	Soil C	Below C	Down Dead C	Above Dead C	Above Live C	Energy C	End Product C	Landfill C	Substitution C	Out of state C
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The 2008 Climate Plan estimated forests and rangeland biomass as well as emissions from some historical products. This estimate has been removed from the ARB website. <http://www.arb.ca.gov/cc/inventory/inventory.htm>

ARB 2014

Mill. Acres	Owner	Soil C	Below C	Down Dead C	Above Dead C	Above Live C	Energy C	End Product C	Landfill C	Substitution C	Out of state C
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ARB has renamed 'Forested Lands and Wood Products' as 'Natural and Working Lands Sector' (page under construction 12/17/2014) and the overall ARB strategy includes offsets. <http://www.arb.ca.gov/cc/inventory/sectors/forest/forest.htm> and <http://www.arb.ca.gov/cc/capandtrade/offsets/offsets.htm>

4th Climate Change Assessment (Resources Agency)

Mill. Acres	Owner	Soil C	Below C	Down Dead C	Above Dead C	Above Live C	Energy C	End Product C	Landfill C	Substitution C	Out of state C
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New research funding is proposed for energy related (CEC) and non-energy related topics in the 2014 4th Climate Change Assessment Plan.

<http://resources.ca.gov/climate/fourth/>

BOF Timber and Fire Authorities

Mill. Acres	Owner	Soil C	Below C	Down Dead C	Above Dead C	Above Live C	Energy C	End Product C	Landfill C	Substitution C	Out of state C
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“The board shall ensure that its rules and regulations that govern the harvesting of commercial tree species, where applicable, consider the capacity of forest resources, including above ground and below ground biomass and soil , to sequester carbon dioxide emissions sufficient to meet or exceed...” (AB 1504) .

BOF – AB 1504

Agency/CalEPA co-chair Forest Carbon Plan (Calfire Director Pimlott – Chair) – AB 32